This listing of claims will replace all prior versions and listings of claims in the Application.

LISTING OF CLAIMS:

1. (Twice Amended) An [unmanned optical] emissions sensor for sensing a gas mixture composition of an exhaust plume of a motor vehicle [travelling along a road], comprising:

a source for radiating a beam of [light] radiation along a path [across a road] such that the beam passes through the exhaust plume of a passing vehicle and otherwise passes through ambient air;

a receiver for sampling radiation levels at a plurality of predetermined wavelengths from the beam;

a canister for emitting a puff of calibration gas in the path of the beam between the source and the receiver, said calibration gas having a known reference composition of gas which absorbs radiation at the predetermined wavelengths;

a data processing computer for computing a gas mixture composition from the [sensed] sampled radiation levels in accordance with stored calibration curves;

a trigger device that produces a trigger signal when a vehicle passes through the beam causing the data processing computer to record the gas mixture composition of the vehicle's exhaust plume for a period of time;

an automated control computer that

a) calibrates the data processing computer by directing the canister to emit a puff of calibration gas, whereby the data processing computer [recomputes] computes the calibration curves in accordance with the known reference composition;

b) verifies the calibration by directing the canister to emit a puff of calibration gas, whereby the data processing computer computes a test composition from the radiation levels and accepts the calibration when the test composition is close enough to the known reference composition and otherwise rejects the calibration and initiates [recalibration] a new calibration; and

c) monitors the gas mixture composition of the ambient air to control [recalibration] calibration of the data processing computer; and

a vehicle identification device that responds to the trigger signal by recording a vehicle identification for the passing vehicle.

2. (Previously Presented) The [unmanned optical] emissions sensor of claim 1, further comprising:

a multi-position lens cover on the receiver, said automated control computer indexing the position of the lens cover when the gas mixture composition of the ambient air deviates from an ambient reference level by more than a specified threshold and initiates [recalibration] a new calibration if the deviation remains greater than the specified threshold.

3. (Previously Presented) The [unmanned optical] emissions sensor of claim 1, wherein the automated control computer monitors the gas mixture composition of the vehicle's exhaust plume to control [reverification] verification of the calibration and initiation of a new calibration.

4. (Previously Presented) The [unmanned optical] emissions sensor of claim 1, wherein the automated control computer monitors a time from the last calibration and when the time exceeds a mandatory recalibration period it initiates [another] a new calibration.

5. (Previously Presented) The [unmanned optical] emissions sensor of claim 1, wherein the automated control computer monitors the data processing computer and power cycles the emissions sensor when the data processing computer fails to produce gas mixture compositions.

6. (Previously Presented) The [unmanned optical] emissions sensor of claim 1, further comprising:

a [manned] control center; and

a communications channel for communication between the automated control computer and the [manned] control center, said automated control computer responding to repeated calibration rejections by transmitting a help message to the [manned] control center, which in turn responds by performing diagnostics to determine a cause for the calibration rejection and then either [remedy] remedies the cause remotely or [dispatch] dispatches a technician to remedy the cause on site.

7. (Twice Amended) The [unmanned optical] emissions sensor of claim 1, further comprising:

a vehicle detector for sensing [an oncoming] a vehicle and computing its acceleration, said data processing computer disabling a [the] [recordation] recording of the gas mixture composition of the vehicle's exhaust plume when the acceleration exceeds a threshold.

8. (Twice Amended) The [unmanned optical] emissions sensor of claim 7, wherein the vehicle detector [compute's] computes the vehicle's speed and computes a time-to-trigger range from the vehicle's measured speed and acceleration, said data processing computer disabling [the] a [recordation] recording of the gas mixture composition of the vehicle's exhaust plume when [triggering] the trigger signal occurs outside the time-to-trigger range.

9. (Twice Amended) The [unmanned optical] emissions sensor of claim 7, wherein said source and said receiver are placed on the same side of [the] a road, further comprising:

a reflector that is positioned on the other side of the road such that the beam emitted by the source reflects off of the reflector and back to the receiver.

10. (Previously Presented) The [unmanned optical] emissions sensor of claim 9, further comprising:

a single console that [contains] comprises the source, the receiver, the canister, the data processing computer, the automated control computer, the vehicle identification device, and the vehicle detector.

11. (Previously Presented) The [unmanned optical] emissions sensor of claim 10, wherein the vehicle identification device comprises an automated license plate reader (ALPR) [that

reads the vehicle's license at an angle of at least 20 degrees and said vehicle detector senses the oncoming vehicle at an angle of at least 20 degrees to maintain a vehicle throughput].

12. (Previously Presented) The [unmanned optical] emissions sensor of claim 10, wherein one of said source and said receiver is positioned above the other so that the beam traverses [the road in] a low path in one direction and [in] a high path in the other direction so that the trigger device will trigger on both high and low ground clearance vehicles.

13. (Twice Amended) An [integrated optical] emissions sensor for sensing a gas mixture composition of an exhaust plume of a motor vehicle [traveling along a road], comprising:

a [single] console that is positioned at one side of [the road] a detection space;

a vehicle detector in said console for sensing [an oncoming] a vehicle and computing its acceleration;

a source in said console for radiating a beam of light along a path [across the road] such that the beam passes through the exhaust plume of [a passing] the vehicle and otherwise passes through ambient air;

a reflector that is positioned on the other side of the [road] detection space such that the beam reflects off of the reflector and back to the console;

a receiver in said console sampling radiation levels at a plurality of predetermined wavelengths from the beam;

a data processing computer in said console for computing a gas mixture composition from the [sensed] sampled radiation levels in accordance with stored calibration curves;

a canister in said console for emitting a puff of calibration gas in the path of the beam between the source and the receiver to [recompute] compute the calibration curves;

a trigger device in said console that produces a trigger signal when [a] the vehicle passes through the beam causing the data processing computer to record the gas mixture composition of the vehicle's exhaust plume for a period of time[, said data processing computer disabling the recordation of the composition of the vehicle's exhaust plume when the acceleration exceeds a threshold]; and

a vehicle identification device in said console that responds to the trigger signal by recording a vehicle identification for the [passing] vehicle.

14. (Previously Presented) The [unmanned optical] emissions sensor of claim 13, wherein the vehicle identification device comprises an automated license plate reader (ALPR) [that reads the vehicle's license at an angle of at least 20 degrees and said vehicle detector senses the oncoming vehicle at an angle of at least 20 degrees to maintain a vehicle throughput].

15. (Previously Presented) The [unmanned optical] emissions sensor of claim 13, wherein one of said source and said receiver is positioned above the other so that the beam traverses the [road] detection space in a low path in one direction and in a high path in the other direction [so that the trigger device will trigger on both high and low ground clearance vehicles].

16. (Twice Amended) The [unmanned optical] emissions sensor of claim 13, wherein the vehicle detector [compute's] computes the vehicle's speed and computes a time-to-trigger

range from the vehicle's measured speed and acceleration, said data processing computer disabling [the] a [recordation] recording of the gas mixture composition of the vehicle's exhaust plume when [triggering] the triggering signal occurs outside the time-to-trigger range.

17. (Previously Presented) The [unmanned optical] emissions sensor of claim 13, wherein said calibration gas has a known reference composition of gas which absorbs radiation at the predetermined wavelengths, further comprising an automated control computer that

a) calibrates the data processing computer by directing the canister to emit a puff of calibration gas, whereby the data processing computer [recomputes] computes the calibration curves in accordance with the known reference composition;

b) verifies the calibration by directing the canister to emit a puff of calibration gas, whereby the data processing computer computes a test composition from the radiation levels and accepts the calibration when the test composition is close enough to the known reference composition and otherwise rejects the calibration and initiates [recalibration] a new calibration; and

c) monitors the gas mixture composition of the ambient air to control [recalibration] calibration of the data processing computer.

18. (Twice Amended) A remote emissions sensing system sensing gas mixture compositions of exhaust plumes for motor vehicles traveling along a network of roads, comprising:

a plurality of [unmanned integrated optical] emissions sensors positioned at different places in the network on a side of the road, each emissions sensor comprising:

a console;

a vehicle detector in said console for sensing [an oncoming] a vehicle and computing its acceleration;

a source in said console for radiating a beam of light along a path across the road such that the beam passes through the exhaust plume of [a passing] the vehicle and otherwise passes through ambient air;

a reflector that is positioned on the other side of the road such that the beam reflects off of the reflector and back to the console;

a receiver in said console that samples radiation levels at a plurality of predetermined wavelengths from the beam;

a data processing computer in said console for computing a gas mixture composition from the [sensed] sampled radiation levels in accordance with stored calibration curves;

a canister in said console for emitting a puff of calibration gas in the path of the beam between the source and the receiver, said calibration gas having a known reference composition of gas which absorbs radiation at the predetermined wavelengths;

a trigger device in said console that produces a trigger signal when [a] the vehicle passes through the beam causing the data processing computer to record the gas mixture composition of the vehicle's exhaust plume for a period of time[, said data processing computer invalidating the recordation of the composition of the vehicle's exhaust plume when the acceleration exceeds a threshold];

an automated control computer that

a) calibrates the data processing computer by directing the canister to emit a puff of calibration gas, whereby the data processing computer [recomputes] computes the calibration curves in accordance with the known reference composition;

b) verifies the calibration by directing the canister to emit a puff of calibration gas, whereby the data processing computer computes a test composition from the radiation levels and accepts the calibration when the test composition is close enough to the known reference composition and otherwise rejects the calibration and initiates [recalibration] a new calibration; and

c) monitors the gas mixture composition of the ambient air to control [recalibration] calibration of the data processing computer; and

a vehicle identification device in said console that responds to the trigger signal by recording a vehicle identification for the [passing] vehicle;

a [manned] control center; and

a communications channel for communication between the emissions sensors and the [manned] control center, said emissions sensors responding to repeated calibration rejections by transmitting a help message to the [manned] control center, which in turn responds by performing diagnostics to determine a cause for the calibration rejection and then either [remedy] remedies the cause remotely or a [dispatch] dispatches a technician to remedy the cause on site.

19. (Twice Amended) The [unmanned optical emissions sensor] system of claim 18, wherein the vehicle detector of the emissions sensors [compute's] computes the vehicle's speed and computes a time-to-trigger range from the vehicle's measured speed and

acceleration, said data processing computer disabling [the] a [recordation] recording of the gas mixture composition of the vehicle's exhaust plume when [triggering] the trigger signal occurs outside the time-to-trigger range.

20. (Previously Presented) The [unmanned optical emissions sensor] system of claim 18, wherein the vehicle identification device of the emissions sensors comprises an automated license plate reader (ALPR) [that reads the vehicle's license at an angle of at least 20 degrees and said vehicle detector senses the oncoming vehicle at an angle of at least 20 degrees to maintain a vehicle throughput].

21. (Previously Presented) The [unmanned optical emissions sensor] system of claim 18, wherein one of said source and said receiver of said emission sensors is positioned above the other so that the beam traverses the road in a low path in one direction and in a high path in the other direction [so that the trigger device will trigger on both high and low ground clearance vehicles].

22-41. (Cancelled)